	Application No.	Applicant(s)
Notice of Allowability	10/694,113	CHENG, WAI BIU
	Examiner	Art Unit	
	Russell Frejd	2128	

*-- The **MAILING DATE** of this communication appears on the cover sheet with the correspondence address--*

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *applicant's filing on 27 October 2003*.

2. ☒ The allowed claim(s) is/are *1-12*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☐ All   b) ☐ Some*   c) ☐ None   of the:

         1. ☐ Certified copies of the priority documents have been received.

         2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

         3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

     * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

     (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

         1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

     (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

     Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

Russell Frejd
RUSSELL FREJD
PRIMARY EXAMINER

Allowance of Application # 10/694,113

1.   The following communication is in response to applicant's filing on 27-October-2003, and

the subsequent interviews with applicant's representative on March 6 and 16, 2006.

Examiner's Amendment

2.   An Examiner's Amendment to the record appears below. Should the changes and/or

additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R.

1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than

the payment of the Issue Fee. Authorization for this Examiner's Amendment was given by

Michael Rickin (Reg. No. 26,984) on March 6 and 16, 2006.

2.1   In the Specification:

Page 3   Line 9 Change "for performing" to --which when executed perform--.

                Line 33 Delete "and".

Page 4   Line 1 Change "trays." to --trays; and--.

                Line 2 Add --(i) causing the regular model to converge to a solution--.

                Line 2 Change "for performing" to --which when executed perform--.

                Line 32 Delete "and".

                Line 35 Change "trays." to --trays; and--.

                Line 36 Add --(i) generating a set of initial values for a regular model of the

                process.--.

Page 5   Line 23 Delete "and".

Line 27 Change "trays." to --trays; and--.

Line 28 Add --(i) causing the regular model to converge to a solution--.

Page 6 Line 17 Delete "and".

Line 21 Change "trays." to --trays; and--.

Line 22 Add --(i) causing the regular model to converge to a solution--.

Page 7 Line 16 Delete "and".

Line 19 Change "trays." to --trays; and--.

Line 20 Add --(i) generating a set of initial values for a regular model of the process.--.

Page 8 Line 16 Delete "and".

Line 19 Change "trays." to --trays; and--.

Line 20 Add --(i) generating a set of initial values for a regular model of the process.--.

Page 9 Line 7 Delete "and".

Line 11 Change "trays." to --trays; and--.

Line 12 Add --(i) causing the regular model to converge to a solution--.

Page 10 Line 2 Delete "and".

Line 5 Change "trays." to --trays; and--.

Line 6 Add --(i) generating a set of initial values for a regular model of the process.--.

2.2   In the Claims:

Claim 1   Line 1 Change "for performing" to --which when executed perform--.

                 Line 25   Delete "and".

                 Line 29 Change "trays." to --trays; and--.

                 Line 30 Add --(i) causing the regular model to converge to a solution--.

Claim 2   Line 1 Change "for performing" to --which when executed perform--.

                 Line 32 Delete "and".

                 Line 35 Change "trays." to --trays; and--.

                 Line 36 Add --(i) generating a set of initial values for said regular model of said

                 process.--.

Claim 3   Line 24   Delete "and".

                 Line 28 Change "trays." to --trays; and--.

                 Line 29 Add --(i) causing the regular model to converge to a solution--.

Claim 4   Line 26   Delete "and".

                 Line 30 Change "trays." to --trays; and--.

                 Line 31 Add --(i) causing the regular model to converge to a solution--.

Claim 5   Line 12 Change "of differential" to --of the differential--.

                 Line 32 Delete "and".

                 Line 35 Change "trays." to --trays; and--.

                 Line 36 Add --(i) generating a set of initial values for said regular model of said

                 process.--.

Claim 6   Line 34 Delete "and".

                 Line 37 Change "trays." to --trays; and--.

Line 38   Add --(i) generating a set of initial values for said regular model of said process.--.

Claim 7   Line 24   Delete "and".

Line 28   Change "trays." to --trays; and--.

Line 29   Add --(i) causing the regular model to converge to a solution--.

Claim 8   Line 31   Delete "and".

Line 34   Change "trays." to --trays; and--.

Line 35   Add --(i) generating a set of initial values for a regular model of said process.--.

Claim 9   Line 2 Change "for performing" to --which when executed perform--.

Line 34   Delete "and".

Line 37   Change "trays." to --trays; and--.

Line 38   Add --(i) generating a set of initial values for said regular model of said process.--.

Claim 10   Line 11   Change "of differential" to --of the differential--.

Line 31   Delete "and".

Line 34   Change "trays." to --trays; and--.

Line 35   Add --(i) generating a set of initial values for said regular model of said process.--.

Claim 11   Line 10   Change "of differential" to --of the differential--.

Line 30   Delete "and".

Line 33   Change "trays." to --trays; and--.

Line 34   Add --(i) generating a set of initial values for said regular model of said

process.--.

Claim 12   Line 11 Add --are-- between "model" and "converted".

Line 31 Delete "and".

Line 34 Change "trays." to --trays; and--.

Line 35 Add --(i) generating a set of initial values for a regular model of said

process.--.

Reasons for Allowance

3.   The following is an Examiner's Statement of Reasons for the indication of allowable subject matter.

3.1   The instant application is directed to a non-obvious improvement over the invention described in USP 4,544,452 (Halliday et al.) which is directed to controlling a fractional distillation column so as to maintain a desired overhead product composition and a desired bottoms product composition without causing the cycling which can occur in interactive fractional distillation columns when the control of overhead product composition and bottoms product composition is based on the output of analysis controllers which are comparing actual and desired concentrations.

3.2   The improvement of the present invention comprises a method that provides guidelines for 1) creating a regular model, and 2) setting up a separate initialization model, for a staged separation process, which in this example is a distillation column. The result of using these guidelines are computer executable regular models that solve the prior art compartmental approach problems of the multi-stage separation process, specifically: the problem of failing to converge to a solution, which the present invention solves by creating the regular model; and the

problem of avoiding initialization failure of the regular model, which the present invention solves

by setting up an initialization model that generates a set of initial values for the regular model.

3.3   The improvement of the present invention is delineated in two specific sets of guidelines.

3.3.1   Claims 1, 3, 4, and 7 are directed to creating a regular model that converges to a solution

by: lumping each of one or more additional trays into an associated compartment that

comprises one or more of the one or more additional trays that are not in another associated

compartment;

treating the feed trays, reboiler return trays and condenser return trays as one tray

compartments;

designating one of the one or more additional trays in each of the associated

compartments comprising one or more additional trays as a sensitive tray;

equating liquid holdup in each of the compartments to the total liquid holdup of the trays

in each of the compartments;

ignoring vapor holdup in each of the compartments;

calculating phase equilibria in an associated compartment only for the sensitive tray;

presuming that all trays other than the sensitive trays in each of the associated

compartments respond instantaneously to liquid and vapor flow;

basing temperatures of all trays other than the sensitive trays in each of the associated

compartments on linear interpolation between the temperature at each of two adjacent sensitive

trays; and

causing the regular model to converge to a solution.

3.3.2 Claims 2, 5, 6, and 8-12 are directed to creating an initialization model that generates a set of initial values for the regular model by: converting all differential equations in the regular model to steady state equations by setting the derivative term of all of the differential equations to zero;

taking the temperature of the condenser return tray as the average of the temperatures of the liquid flow from the condenser and the feed stream flow;

taking the temperature of the reboiler return tray as the average of the temperatures of the vapor flow from the reboiler and the feed stream flow;

taking the liquid flow in the condenser return tray to be the same as the liquid flow from the condenser;

taking the vapor flow in the reboiler return tray to be the same as the vapor flow from the reboiler;

taking the liquid flow in the feed tray as the sum of the liquid flow from the condenser and the feed stream flow;

assuming that all of the trays have 100% efficiency;

assuming there is no interaction between the vapor and liquid flows through the compartments with multiple trays; and

generating a set of initial values for a regular model of the process.

3.4 The art of record, either individually or in combination, fails to teach, suggest, or render obvious the useful, concrete and tangible <guidelines for a staged separation process that creates a regular model that converges to a solution, and an initialization model that generates a set of initial values for the regular model> having the corresponding structure which is disclosed

In re Application of: Cheng

in the specification and equivalents thereof at least at page 10, line 11 through page 14, line 31, and Figure 1. In view of the foregoing, the claims of the present application are found to be patentable over the prior art.

Response Guidelines

4.   Any comments considered necessary by applicant **MUST** be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably accompany the Issue Fee. Such submissions should clearly be labeled "Comments on Statement of Reasons for Allowance".

4.1   Any response to the Examiner in regard to this allowance should be

directed to: Russell Frejd, telephone number (571) 272-3779, Monday-Friday from 0530 to 1400 ET, **or** the examiner's supervisor, Kamini Shah, telephone number (571) 272-2279. Inquires of a general nature or relating to the status of this application should be directed to the TC2100 Group Receptionist (571) 272-2100.

mailed to: Commissioner of Patents and Trademarks P.O. Box 1450, Alexandria, VA 22313-1450

or faxed to: (571) 273-8300

Hand-delivered responses should be brought to the Customer Service Window, Randolph Building, 401 Dulany Street, Alexandria, VA, 22314.

Date: 16-March-2006

**RUSSELL FREJD
PRIMARY EXAMINER**